MOULT IN TURDOIDES ALTIROSTRIS, THE IRAQI BABBLER

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Of the four species of *Turdoides* found in the Palearctic region *Turdoides altirostris* (Hartert) the Iraqi Babbler is the smallest in size having a restricted distribution in lower Iraq and the neighbouring parts of southwest Iran. They inhabit mostly in the *Phragmites australis* (Cav.) Trin. ex Steud. reeds growing in wet areas. The breeding biology of the species has been worked out by Al-Dabbagh (1970).

A study of the moult of the Iraqi Babbler was undertaken with a view to examine whether there is any adaptive change in the moult connected with the life in a temperate region of this mostly tropical group of birds.

The moult of the Iraqi Babbler is seasonal and the moult season is concentrated ; occurring towards the close of breeding season. The moult span period is half compared to its congener *Turdoides striatus* (Dumont) the Jungle Babbler in the tropical region (Naik & Andrews 1966).

MATERIAL AND METHOD

A total of one hundred and one observations based on fifty-seven specimens (51 ringed and 6 collected birds) covering every month of the year except May, were made on moulting of the Iraqi Babbler at Shafi Field Station, Basrah, Iraq, between 1976 and 1979.

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Birds were mist-netted and notes were taken with emphasis on primary moult. All of them were ringed and soon released except those kept for the collection of the museum. Birds were identified into two categories as adult and juvenile. Juveniles were identified on a combination of characters namely, yellowish gape, naked breast and belly (devoid of down), and a wing-length of 72 mm or lesss. The breast and belly area of the Iraqi Babbler juveniles were usually naked like the juveniles of *Passer domesticus*, however, a few down feathers were occasionally found to be present. Feather scoring and numbering were done as per the British Turst for Ornithology moult record card. In the Iraqi Babbler sexes are alike in plumage colouration ; juvenile plumage appears similar to the adult plumage. The lustre of the renewed feathers was found fading soon and henoe it was difficult at times to differentiate the old feather from the new.

OBSERVATIONS AND RESULTS

The primary moult in the population began between mid July and mid August (12 July to 22 August) ; one early bird in mould (P 1 & 2) collected on 1 July probably began moulting in late June.

All birds (adults and juveniles) examined in August, September, and October were in moult except two in August and one in October, all these three were juveniles not yet started moulting (Table 1).

The October birds were in advanced stage of primary moult, having been completed P5, moulting P6 to 10. Three had almost completed the moult but for the sheath at bases of the distal primaries, of these two were collected

Table 1. Monthly distribution of the Iraqi Babbler examined for primary moult and those completed moult, at Shafi, Basrah, Iraq.

	Jan.	Feb.	Mar.	Apr.	May	June
Birds examined	4	18	17	13	0	4
Birds with primary moult	0	0	0	2*	0	0

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Birds examined	2	9	5	11	9	10
Birds with primary moult	1	7	5	10	5	1
Birds completed moult	0	0	0	0	4	9

* In a repeat bird P10 and S8 on both wings, right central and left outermost rectrices were in moult on 30 April 1979. The fact that the same bird on a previous repeat on 15 Oct. 1978 was nearing completion of moult (P7 to 10) indicates that the April moult was the result of accidental loss and replacement. The second bird, a juvenile (with yellowish gape, naked breast and belly, having wing of 72 mm) on 17 April 1978 was moulting P1 & 2 on both wings and the third left rectrice. For other details see text.

on 15th and one on 29th. Two birds, one juvenile and one adult, were still in early stage of moult, moulting P1 to 3 and P2 & 3 respectively. In November four out of nine birds had completed their primary moult and the rest were nearing completion except two juveniles which were only half way through (P4 & 5, and 5).

All December birds were with fresh primaries save one adult which was renewing P9 & 10 on 23 December.

The primary moult season in the population had lasted from mid July to mid December (once as early as mid June and once as late as end December) for a period of five months. Majority of the birds completed the moult by mid November (Fig. 1).

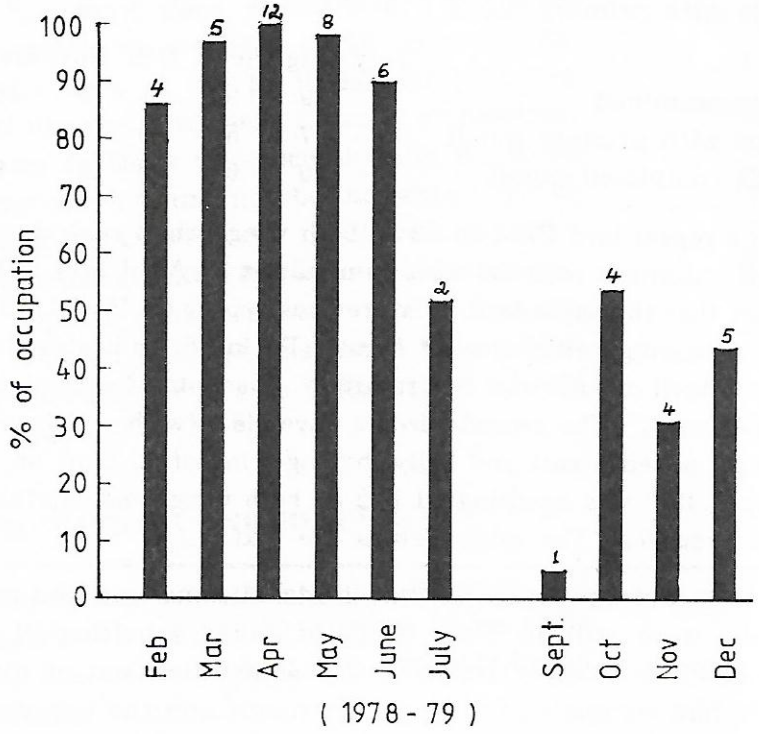

Fig. 1. Monthly frequency of occupation of pole type A by *Passer domesticus*. All the 197 poles contained nests. Numbers on top indicate the number of surveys.

Juvenile Moult :

At the start of the juvenile moult the outermost primaries were full grown as indicated by the absence of sheath at their bases. Thesmallest wing-length of the moulting juvenile was 68 mm.

One juvenile moulting the first primary on 16 August 1976 was repeated subsequently three times (29 Aug., 7 & 13 Sept.) the same year. Although the primary moult was in progress during these times, there was no moult of secondary, tail or body feathers.

Another juvenile moulting P1, 2, & 3 on 21 October 1978 was repeated twice (19 & 26 Nov.) the same year. On these two occasions although the primary moult was continuing, no secondary or tail feathers were in moult. However, when repeated on 18 February 1979, the primary moult was over, but S1 & 2 and the central pair of tail feathers were in moult. Crural tract feathers in brush stage found on 21 October and the pin feathers noted on the sides of breast on 26 November could have been the late-developing feathers as observed in *T. striatus* by Andrews and Naik (1966). Otherwise no body moult was observed.

Thus the primary moult in juveniles took place during the moult season in the same year they were born. The moult of secondary and tail feathers appear to take place a little later and the timing of their moult are not clear with the available specimens and needs further study.

The greater secondary coverts were renewed prior to the moult of P4 in the above two juveniles as in the adult (see later). Body feathers did not seem to moult during the first juvenile moult.

Adult Moult

The primary moult began with the innermost (P1) and proceeded in a regular fashion to the outermost in a descening order. The greater primary coverts moulted with their respective primaries.

Based on the moult sequence shown the nine secondaries, numbered from outer to inner, is divided arbitrarily into two sets namely, the distal one forming S1 to 5 and the proximal one forming S6 to 9.

The moult of the secondary invariably started with S1 and the distal set proceeded in a regular order from S1 to 5. The moult of the S1 began with the moult of P3 but was found lingering on till the moult of P6 (Table 2).

The proximal set moult was initiated with S7 soon after the start of S1. Although the further sequence could not be traced with the limited samples, this set was found completing the moult much earlier than the distal set.

The greater secondary coverts were found renewed with the moulting of P3. The last to complete the moult among the remiges was either P10 or S5. The rectrice moult started with the central pair any time between the moult of P3 and 7 (Table 2), and proceeded outwards, centrifugally. Usually the rectrice moult was completed with the completion of the primary moult, however, it was also observed continuing even after. The upper and lower tail coverts moult preceeded the moult of rectrices. In two adults the rectrices moult, observed on six repeats — three each, occurred in a regular fashion from inner to outer.

Body moult took place all along the moult period, taking place prior to start of primary moult and some times continuing even after the completion of the primary moult.

Table 2. Primary moult stages of the Iraqi Babbler to show the timing of the secondary and rectrice moult start.

Primary feather whose moult coincide with the start of rectrice moult	Rectrice						Secondary									Primary										Primary feather whose moult coincide with the S1 moult
							Proximal					Distal															
	3	2	1	1	2	3	9	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	9	10	
	o	o	o	o	o	o	o	o	o	o	o	o	o	o	¾	N	N	¾	o	o	o	o	o	o	o	Third
	o	o	o	o	o	o	o	o	o	o	o	o	o	o	¾	N	+¾	¾	o	o	o	o	o	o	o	Third
	o	o	o	o	o	o	o	o	o	o	o	o	o	o	¾	N	N	N	N	P	o	o	o	o	o	Fourth
	o	o	o	o	o	o	o	o	o	o	o	o	o	o	¾	N	N	N	½	o	o	o	o	o	o	Third
Third	o	o	N	+¾	o	o	o	o	o	o	o	o	o	o	N	N	N	N	N	+¾	P	o	o	o	o	Fourth
Fifth	o	o	¾	¾	o	o	o	o	+¾	P	o	o	o	P	N	N	N	N	N	N	+¾	½	P	o	o	Fifth
Seventh	o	¼	½	½	¼	o	o	o	N	o	o	o	o	½	N	N	N	N	N	N	N	P	o	o	o	Sixth
Sixth	o	o	+½	+½	o	o	o	o	P	o	o	o	o	P	+¾	N	N	N	N	N	N	P	o	o	o	

Note: o, P, & N mean old, pin, and new feather respectively; ¼, ½, & ¾ indicate the length attained by the moulting feather

Number of feathers moulting at a time (one side)

Once the moult began one or more feathers were in moult during the moult span of a bird except in one case (see later). One to four primaries, two and three common, were in moult at one time. On all the three occasions when four primaries were noted moulting it was inveriably towards the close of the primary moult (P7 to 10, this took place twice in 15 Oct. and once on 3 Nov.). One to three feather moult occurred at any stage of the moult ; at the start, middle, or towards the end.

In the proximal set of secondaries (S6 to 9) two feather simultaneous moult was common. However, only one feather was in moult in the distal set (S1 to 5). More than one feather moult was usual for the rectrices and this ranged from one to six feathers.

Time required for the moult

The moult time of one score (5 scores per feather) was estimated from the difference in scores and the tie elapsed between repeats. The primary moult time was then calculated by multiplying this estimate by fifty. The primary moult duration comes to 79.5 days for two adults moulting distal primaries (P5 to 10). When calculated for an adult repeated between the moult of P2 & 3 and P9 & 10, this period comes to 88.5 days. It is known that the moult rate is faster towards the close of moult than at the beginning. Therefore, the duration shown by the second sample 88.5 days is a good approximation for the renewal of primary feathers in adult.

One bird (female) with a well developed wrinkled brood patch caught on 2 August 1976 was moulting as follows : P1 news, P2 almost full grown, P3 $\frac{3}{4}$ grown, rest old (score 13) ; S1 $\frac{3}{4}$ grown, rest old ; there was no tail or body

moult. On 15 August this bird did not show any moult. However, when repeated on 3 November 1976 it was moult-in P7 to 10 (score 44), all rectrices and many body feathers. The primary moult duration estimated on this bird comes to 150 days, about 66 per cent more than what is normally required. The well formed brood patch present on the day of ringing and the absence of any moult on the subsequent repeat on 15 August points to the probable occurrence of an arrested moult resulting from breeding activities in between the original capture and subsequent repeats.

Since only one feather was in moult at any time, the distal secondary set moult rate oculd be calculated more precisely. Each feather (2 to 4), based on seven repeats of two adults took an average of twenty-one days. In the proximal set, each feather took about half the time or less. Two adults took less than 56 and 63 days for the complete renewal of rectrices. Assuming that the fifth secondary is the last to complete the moult and allowing one week for the same, a thirteen-week period is a good estimate for the moult span of an adult Iraqi Babbler.

Wing and tail measurements

The sixth primary feather forms the wing tip and from this to the tenth the primary feathers gradually decrease in length. In a bird with a wing of 79 mm these primary feathers measured (from the point of insertion in the skin to the tip) in mm as : P6 : 60, P7 : 59, P8 : 57, P9 : 48, and P10 : 33.

The flattened, straightened wing in juvenile averaged 70.6 mm (n : 17, range : 68-72) and that of the adult averaged 76.5 mm (n : 81, range : 73-82). The tail of the adult averaged 103.6 mm (n : 8, range : 98-112).

DISCUSSION

The annual moult in the Iraqi Babbler started with the innermost primary and proceeded outwards in a regular manner. With the renewal of the distal primary (P10) moulting of the rest of feathers (secondaries, rectrices, and body feathers) were normally completed. However, the last one to complete the moult appeared to be the fifth secondary. Thus the primary moult period properly marks the moult span of the bird.

The moult sequence of *Turdoides altirostris,* the Iraqi Babbler is similar to the one described for *T. striatus* the Jungle Babbler (Andrews and Naik 1966), and is in conformity with most of the passerines. In the Jungle Babbler, which lives in a tropical climate, the moulting season lasts for seven months while the same in the Iraqi Babbler is five months, much concentrated.

The primary moult span of individual Iraqi Babbler is about three months which is half the time needed by the Jungle Babbler. Whether the shorter primary moult span is resulted from an increased moult rate is not clear. However, the number of primaries growing at one time in the Iraqi Babbler was higher (1 to 4, 2 and 3 common, Fig. 1) compared to the Jungle Babbler, where more than two feather growth was rare, only twice observed. The duration of the moult may vary considerably even in related species has been shown by Pitelka (1945). He records it as varying from three to almost six months in various species of *Aphelocoma.*

The breeding (egg-laying) season of the Iraqi Babbler extends from mid March to August (Al-Dabbagh 1970,

Marchant 1963). The annual moult of this species started towards the close of the breeding season. No overlap between breeding and moulting has been reported. However, a suspected case of arrested moult due to intervention of breeding activities is presented. Although the coincidence between moulting and breeding is common in *T. striatus,* no arrested moult during breeding season has been reported.

Since the moult season starts only towards the close of the breeding season (possibly after the breeding), the concentrated moult season with the accelerated moult span enable the Iraqi Babbler to clothe well with a fresh insulative cover prior to the onset of winter, thereby fit itself to tide over the winter in a temperate region.

SUMMARY

The moult of adult *Turdoides altirostris* the Iraqi Babbler is annual and complete, occuring towards the close of the breeding season, and is completed prior to the onset of winter. In juveniles it appears to be partial covering only remiges and rectrices.

The moult sequence in the main is similar to the one described for *T. striatus,* but differs in having the moult season concentrated. The moult span of individual bird takes nearly thirteen weeks, about one-half the time required for *T. striatus.* The moult time of the primary, secondary, and rectrices are given.

An instance of arrested moult on circumstantial evidence is presented. The concentrated moult season and the shorter moult span are considered as adaptive features for the temperate conditions.

الخلاصـــة

دراسة عن تبديل حلة الريش لطائر الشرثاره العراقية . حيث يبين أن تبديل حلة هذا الطائر هو سنوي وبصورة متكاملة على جسم الطائر . ويبتدأ في وقت قريب من موسم التناسل ويكتمل في الفترة التي تقـــع مباشرة قبل موسم الشتاء . بينت الدراسة أيضا أن اليافع يختلف عن البالغ في تبديل حلل ريشه . وأوضحت الدراسه أوجه التشابه والاختلاف فـي تبديل حلل الريش في طائر الشرثاره العراقية عن غيرها من الطيـــــور المشابهة .

كما ان تبديل الحله يتأثر بالظروف المحيطية الفجائية . وأن فتـرة تبديل الحله الموسمي وقصر فترتها تتبين كصفات تأقلمية تتعلق بالظروف المعتدلة ..

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